WHAT IS CLAIMED IS:

1. A sensing system for sensing a load, comprising:

a sensing pad, the sensing pad further comprising a laminate structure and an array of optical sensors.

2. The sensing system of Claim 1, wherein the laminate structure comprises two layers of silicone foam with an adhesive inbetween.

3. The sensing system of Claim 1, wherein each optical sensor comprises two optical fibers joined side by side at one end.

4. The sensing system of Claim 1, further comprising a strain relief within the sensing pad for at least one of the optical sensors.

5. The sensing system of Claim 1, further comprising a strain relief between the array of optical sensors and a termination of optical fibers comprising the optical sensors.

6. The sensing system of Claim 1, further comprising a light source and a light detector for transmitting light to the array and receiving light from the array.

7. The sensing system of Claim 1, wherein the sensing pad comprises cutouts for a trench.

8. The sensing system of Claim 1, further comprising a control sensor for adjusting the array of optical sensors.

9. The sensing system of Claim 8, further comprising a second foam laminate structure for the control sensor.

10. The sensing system of Claim 8, wherein the control sensor is an optical sensor.

11. The sensing system of Claim 1, wherein the sensing pad comprises a laminated foam structure with an array of optical sensors between laminates of foam, each sensor comprising a pair of optical fibers joined at one end, and each sensor adhered to an inside surface of a foam laminate.

12. The sensing system of Claim 1, further comprising a microprocessor controller, at least one light source, and at least one light detector, for controlling the array of sensors.

13. The sensing system of Claim 12, wherein the light detector is a linear array sensor.

14. The sensing system of Claim 1, wherein the array is in the shape of a square matrix, the sensors generally located at intersections of a series of vertical and horizontal lines, and wherein the sensors are not located within trenches.

15. The sensing system of Claim 1, further comprising a cover for the pad.

16. The sensing system of Claim 15, wherein the cover comprises a liquid barrier.

17. A combination of the sensing system of Claim 1, a seat and a trim cover.

18. A sensing system for sensing a load, comprising:
a sensing pad, the sensing pad further comprising a laminate structure and an array of optical sensors, wherein at least one sensor includes a strain relief.

19. The sensing system of Claim 18, wherein the optical sensors comprise waveguides.

20. The sensing system of Claim 18, wherein the sensing pad comprises two layers of silicone foam with an adhesive inbetween.

21. The sensing system of Claim 18, further comprising a control sensor for adjusting the array of optical sensors.

22. The sensing system of Claim 18, further comprising a cover for the pad.

23. A combination of the sensing system of Claim 18, a seat, and a trim cover.

24. A sensing system for sensing a load, comprising:
an array of optical sensors in a sensing pad; and
a liquid barrier material covering the pad.

25. The sensing system of Claim 24, wherein the sensing pad comprises a foam layer and a second layer, and an adhesive inbetween, the array of sensors adhered to the adhesive.

26. The sensing system of Claim 24, wherein each sensor is arranged in the sensing pad with a strain relief.

27. The sensing system of Claim 24, further comprising a control sensor for controlling the array of optical sensors.

28. The sensing system of Claim 24, further comprising a cover for the pad.

29. A combination of the sensing system of Claim 24, a seat, and a trim cover.

30. A method of manufacturing a system for sensing a load, the method comprising:

placing a plurality of optical sensors onto an adhesive surface;

assembling ends of the optical sensors into terminations;

adhering a foam layer to the adhesive surface; and

adhering a second layer over the sensors to form a sensing pad.

31. The method of Claim 30, wherein the step of placing the optical sensors includes placing a strain relief for at least one optical sensor.

32. The method of Claim 30, further comprising trimming two optical fibers at a time, wherein the step of trimming joins ends of the fibers to form an optical sensor.

33. The method of Claim 32, wherein the optical fibers are plastic and the step of trimming is performed with a laser.

34. The method of Claim 30, further comprising assembling a strain relief for the sensing pad.

35. The method of Claim 30, further comprising covering the sensing pad with an opaque liquid barrier.

36. The method of claim 30, further comprising forming a control sensor for the system.

37. The method of claim 30, wherein the second layer is a foam layer.

38. The method of Claim 30, further comprising assembling the system into a seat.

39. A system for sensing a load, comprising

a sensing pad comprising two layers of silicone foam joined by an adhesive, and an array of optical sensors adhered to the adhesive; and

a first interface gathering an end of a first fiber from each sensor and a second interface gathering an end of a second fiber from each sensor.

40. The system of Claim 39, wherein each optical sensor comprises a pair of optical fibers joined side by side at an end of each fiber.

41. The system of Claim 39, wherein the first interface is an optical interface to a light source and the second interface is an optical linear array sensor.

42. The system of Claim 39, further comprising an opaque liquid barrier covering the sensing pad.

43. The system of Claim 39, further comprising at least one of a strain relief between the first interface and the sensors, a strain relief between the second interface and the sensors, and a strain relief for at least one of the sensors.

44. The system of Claim 39, further comprising a control sensor connected to the first interface and the second interface.

45. The system of Claim 39, further comprising a microprocessor controller in controllable communication with the sensors and at least one of a DSP and an EEPROM in communication with the microprocessor.

46. A combination of the sensing system of Claim 39, a seat, and a trim cover.

47. A system for sensing a load on a seat, the system comprising:

a seat;

a sensing pad atop the seat, the sensing pad further comprising an array of optical sensors made from optical fibers;

a trim cover;

a first interface gathering an end of one of said fibers from each sensor and a second interface gathering an end of another of said fibers from each sensor;

a microprocessor controller for sensing outputs of the sensor; and

software embodied on a computer-readable medium and accessible to the microprocessor controller for computing at least one of a mass and a shape of a load on the seat.

48. The system of Claim 47, wherein the computer and the software compute using at least one technique selected from the group consisting of machine vision, blob analysis, feature shape, feature moment, neural networks, object segmentation, object recognition, fuzzy logic, decision tree, K-nearest neighbor, quadratic classification, a polyphase filter, and linear classification.

49. The system of Claim 47, wherein each optical sensor comprises at least one pixel and further comprising a plurality of virtual sensors.

50. The system of Claim 49, wherein at least a portion of the virtual sensors are located in a trench of the seat.

51. The system of Claim 49, wherein at least two nearest sensors are weighted from about 40/60 to about 60/40 in computing at least one of the mass and the shape of the load.

52. The system of Claim 47, wherein the system further comprises a built-in-test routine.

53. The system of Claim 47, wherein the sensing pad comprises two layers of silicone foam joined by an adhesive, the array of optical sensors adhered to the adhesive, and wherein each optical sensor comprises a pair of optical fibers joined side by side at one end of each fiber.

54. The system of Claim 47, wherein the system includes at least two light sources and two light detectors operably connected to the sensors.

55. The system of Claim 54, wherein the software includes a routine for driving the at least two light sources at different times.

56. The system of Claim 49, wherein at least one of the virtual sensors is weighted in calculations used to compute at least one of the mass and the shape of the load.

57. A method for sensing a load on a seat, the method comprising:

forming a seat, the seat comprising a sensing pad having an array of optical sensors within the pad;

placing a load on the seat; and

operating the optical sensors and a machine vision computer program to determine at least one of a mass and a shape of the load.

58. The method of Claim 57, wherein the method comprises controlling an output of optical light sources for the optical sensors with a control sensor.

59. The method of Claim 57, wherein the optical sensors are pulsed alternately.

60. The method of Claim 57, wherein the method comprises a step of normalizing the optical sensors between zero and a maximum load.

61. The method of Claim 57, wherein the method comprises a step of mapping data onto a grid of sensors to determine a mass of the load.

62. The method of Claim 57, wherein the method comprises a step of mapping data onto a grid of real sensors and virtual sensors to determine a shape of the load.

63. The method of Claim 57, wherein the method comprises a step of applying a polyphase filter to data calculated in the program.

64. The method of Claim 57, wherein the method comprises a step of comparing a shape of the load to at least one of a plurality of shapes in a library of shapes and deciding whether the shape of the load matches at least one of the plurality of shapes.

65. A method for classifying an occupant of a seat, the method comprising:
occupying the seat;
operating a sensing pad with an array of optical sensors within the seat;
storing data from said optical sensors in a memory accessible to a computer;
calculating at least one of a mass and a shape of the occupant;
deciding whether the occupant is a human or a non-human; and
sending a signal.

66. The method of Claim 65, wherein the method comprises controlling an output of optical light sources for the optical sensors with a control sensor.

67. The method of Claim 65, wherein the optical sensors are pulsed alternately.

68. The method of Claim 65, wherein the method comprises a step of normalizing the optical sensors between zero and a maximum load.